

WHAT IS CLAIMED IS:

1. A method for controlling a storage device system, the storage device system including
  - at least one information processing device,
  - 5 at least first storage device and second storage device equipped with a first storage volume and a second storage volume, respectively,
  - wherein the information processing device is communicatively connected to the first storage device,
  - the first storage device is communicatively connected to the second
  - 10 storage device,
  - the information processing device is equipped with a first write request section that requests to write data in the first storage device according to a first communications protocol, and
  - the first storage device is equipped with a second write request
  - 15 section that requests to write data in the second storage device according to a second communications protocol,
  - the method comprising:
    - a step of creating first data including a first instruction to be executed in the second storage device;
    - 20 a step of transmitting from the information processing device to the first write request section a request to write the first data in the first storage volume according to the first communications protocol;
    - a step of transmitting from the first storage device to the second write request section a request to write the first data in the second storage

volume according to the second communications protocol, when the first data written in the first storage volume is an instruction to the second storage device; and

a step of executing the first instruction set in the first data written  
5 in the second storage volume at the second storage device.

2. A method for controlling a storage device system according to claim 1, further comprising:

a step of creating second data including a second instruction to be  
10 executed by the first storage device;

a step of transmitting from the information processing device to the first write request section a request to write the second data in the first storage volume according to the first communications protocol; and

a step of executing the second instruction at the first storage device  
15 when the second data written in the first storage volume is an instruction to the first storage device.

3. A method for controlling a storage device system according to claim 1, wherein the first storage device includes a third storage volume,  
20 the second storage device includes a fourth storage volume, and the second storage device includes a read request section that requests the first storage device to read data according to a third communications protocol, the method comprising:

a step of creating the first data including as the first instruction a

pair forming instruction to form a pair of the third storage volume as being a primary storage volume and the fourth storage volume as being an auxiliary storage volume; and

a step conducted by the second storage device of receiving the pair  
5 forming instruction set in the first data written in the second storage volume, and transmitting to the read request section a request to read data in the third storage volume and write the data into the fourth storage volume according to the third communications protocol.

10 4. A method for controlling a storage device system according to claim 1, wherein the first storage includes a third storage volume, and the second storage device includes a fourth storage volume and a sixth storage volume, the method comprising:

a step of creating the first data including as the first instruction a  
15 pair forming instruction to form a pair of the third storage volume as being an auxiliary storage volume and the fourth storage volume as being a primary storage volume; and

a step conducted by the second storage device of receiving the pair  
forming instruction set in the first data written in the second storage  
20 volume, and storing in the sixth storage volume a copy of data to be written in the fourth storage volume and positional information of the data as a journal.

5. A method for controlling a storage device system according to

claim 3, wherein the first storage device includes a fifth storage volume,  
and the second storage device includes a sixth storage volume, wherein a  
pair is formed with the third storage volume as being a primary storage  
volume and the fourth storage volume as being an auxiliary storage  
5 volume, and a copy of data to be written in the third storage volume and  
positional information of the data are stored in the fifth storage volume as  
a journal, the method comprising:

a step of creating the first data including as the first instruction a  
journal acquisition instruction to store a copy of the journal into the sixth  
10 storage volume; and

a step conducted by the second storage device of receiving the  
journal acquisition instruction set in the first data written in the second  
storage volume, and transmitting to the read request section a request to  
read data in the fifth storage volume and write the data into the sixth  
15 storage volume according to the third communications protocol.

6. A method for controlling a storage device system according to  
claim 5, comprising:

a step of creating the first data including as the first instruction a  
20 restoration instruction to update the fourth storage volume using a  
journal stored in the sixth storage volume; and

a step conducted by the second storage device of receiving the  
restoration instruction set in the first data written in the second storage  
volume, and writing data stored in the journal written in the sixth storage

volume into the fourth storage volume.

7. A method for controlling a storage device system according to claim 4, comprising a step conducted by the second storage device of  
5 storing pair management information indicating that the pair is formed with the third storage volume as being an auxiliary storage volume and the fourth storage volume as being a primary storage volume.

8. A method for controlling a storage device system according to  
10 claim 7, comprising:

a step of creating the first data including as the first instruction a pair swap instruction to swap the pair such that the third storage volume is set as a primary storage volume and the fourth storage volume is set as an auxiliary storage volume;

15 a step conducted by the second storage device of receiving the pair swap instruction set in the first data written in the second storage volume, and storing in the pair management information data indicating that the third storage volume is the primary storage volume and the fourth storage volume is the auxiliary storage volume; and

20 a step conducted by the second storage device of receiving the pair swap instruction, and stopping the step of storing in the sixth storage volume history of data written in the fourth storage volume as a journal.

9. A storage device system comprising:

at least one information processing device;

at least first storage device and second storage device equipped with  
a first storage volume and a second storage volume, respectively;

wherein the information processing device and the first storage  
5 device are communicatively connected to one another,

the first storage device and the second storage device are  
communicatively connected to one another,

the information processing device includes a first write request  
section that requests to write data in the first storage device according to a  
10 first communications protocol,

the first storage device includes a second write request section that  
requests to write data in the second storage device according to a second  
communications protocol,

the information processing device includes an instruction setting  
15 section that creates first data including a first instruction to be executed  
in the second storage device, and an instruction transmission section that  
transmits to the first write request section a request to write the first data  
in the first storage volume according to the first communications protocol,

the first storage device includes a data transfer section that, when  
20 the first data written in the first storage volume is an instruction to the  
second storage device, transmits to the second write request section a  
request to write the first data in the second storage volume according to  
the second communications protocol, and

the second storage device includes an instruction execution section

that executes the first instruction set in the first data written in the second storage volume.

10. A storage device system according to claim 9, wherein
- 5 the instruction setting section of the information processing device creates second data including a second instruction to be executed by the first storage device,
- the instruction transmission section of the information processing device transmits to the first write request section a request to write the
- 10 second data in the first storage volume according to the first communications protocol, and
- the first storage device includes a first instruction execution section that, when the second data written in the first storage volume is an instruction to the first storage device, executes the second instruction.

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11. A storage device system according to claim 9, wherein
- the first storage device includes a third storage volume,
- the second storage device includes a fourth storage volume,
- the second storage device includes a read request section that
- 20 requests the first storage device to read data according to a third communications protocol,
- the instruction setting section of the information processing device creates the first data including as the first instruction a pair forming instruction to form a pair of the third storage volume as being a primary

storage volume and the fourth storage volume as being an auxiliary storage volume, and

the second storage device includes a copy forming section that receives the pair forming instruction set in the first data written in the second storage volume, and transmits to the read request section a request  
5 to read data in the third storage volume and write the data into the fourth storage volume according to the third communications protocol.

12. A storage device system according to claim 9, wherein  
10 the first storage includes a third storage volume,  
the second storage device includes a fourth storage volume and a sixth storage volume,

the instruction setting section of the information processing device creates the first data including as the first instruction a pair forming  
15 instruction to form a pair of the third storage volume as being an auxiliary storage volume and the fourth storage volume as being a primary storage volume, and

the second storage device includes a journal storage section that receives the pair forming instruction set in the first data written in the second storage volume, and stores in the sixth storage volume a copy of  
20 data written in the fourth storage volume and positional information of the data as a journal.

13. A storage device system according to claim 11, wherein



the first storage device includes a fifth storage volume,

the second storage device includes a sixth storage volume, wherein  
a pair is formed with the third storage volume as being a primary storage  
volume and the fourth storage volume as being an auxiliary storage  
5 volume, and a copy of data to be written in the third storage volume and  
positional information of the data are stored in the fifth storage volume as  
a journal,

the instruction setting section of the information processing device  
creates the first data including as the first instruction a journal

10 acquisition instruction to store a copy of the journal into the sixth storage  
volume, and

the second instruction execution section includes a journal  
acquisition section that receives the journal acquisition instruction set in  
the first data written in the second storage volume, and transmits to the  
15 read request section a request to read data in the fifth storage volume and  
write the data into the sixth storage volume according to the third  
communications protocol.

14. A storage device system according to claim 13, wherein

20 the instruction setting section of the information processing device  
creates the first data including as the first instruction a restoration  
instruction to update the fourth storage volume using a journal stored in  
the sixth storage volume, and

the second instruction execution section includes a restoration

section that receives the restoration instruction set in the first data written in the second storage volume, and writes data stored in the journal written in the sixth storage volume into the fourth storage volume.

5           15.    A storage device system according to claim 12, wherein  
the second storage device includes a pair management section that stores pair management information indicating that the pair is formed with the third storage volume as being an auxiliary storage volume and the fourth storage volume as being a primary storage volume.

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16.    A storage device system according to claim 15, wherein  
the instruction setting section of the information processing device creates the first data including as the first instruction a pair swap instruction to swap the pair such that the third storage volume is set as a  
15 primary storage volume and the fourth storage volume is set as an auxiliary storage volume,

the pair management section of the second instruction execution section receives the pair swap instruction set in the first data written in the second storage volume, and stores in the pair management  
20 information data indicating that the third storage volume is the primary storage volume and the fourth storage volume is the auxiliary storage volume, and

the second storage device includes a journal stop section that receives the pair swap instruction, and stops a processing to store in the

sixth storage volume history of data written in the fourth storage volume as a journal.

17. A storage device system comprising:

5 at least first and second storage devices communicatively connected to each other;

wherein the first storage device includes a first storage volume,  
a second write request section that requests to write data in the  
second storage device according to a second communications protocol, and  
10 a data transfer section that, when first data written in the first  
storage volume is an instruction to the second storage device, transmits to  
the write request section a request to write the first data in the second  
storage device according to the second communications protocol.

15 18. A storage device system according to claim 17, wherein  
the second storage device includes a second storage volume that  
stores the first data, and an instruction execution section that executes  
the first instruction set in the first data stored in the second storage  
volume.

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19. A storage device system according to claim 18, wherein  
the first storage device includes a third storage volume, and  
the second storage device includes  
a fourth storage volume,

a read request section that requests the first storage device to read data according to a third communications protocol,

a pair management section that, when the first instruction is an instruction to form a pair with the third storage volume of the first storage device as being a primary storage volume and the fourth storage volume as being an auxiliary storage volume, stores pair management information indicating that the pair is formed with the third storage volume as being a primary storage volume and the fourth storage volume as being an auxiliary storage volume, and

a copy forming section that transmits to the read request section a request to read data in the third storage volume and write the data into the fourth storage volume according to the third communications protocol.

20. A storage device system according to claim 18, wherein the second storage device includes

a sixth storage volume, wherein the pair management section that, when the first instruction is an instruction to form a pair with the third storage volume of the first storage device as being an auxiliary storage volume and the fourth storage volume as being a primary storage volume, stores pair management information indicating that the pair is formed with the third storage volume as being the auxiliary storage volume and the fourth storage volume as being the primary storage volume, and

a journal storage section stores in the sixth storage volume a copy of data written in the fourth storage volume and positional information of

the data as a journal.

21. A storage device system according to claim 20, wherein, when the pair is formed with the third storage volume as being the auxiliary  
5 storage volume and the fourth storage volume as being the primary storage volume, and when the first instruction is a pair swap instruction to swap the pair such that the third storage volume is set as a primary storage volume and the fourth storage volume is set as an auxiliary storage volume, the pair management section stores in the pair  
10 management information data indicating that the third storage volume is the primary storage volume and the fourth storage volume is the auxiliary storage volume, and the second storage device is equipped with a journal stop section that stops a processing to store in the sixth storage volume history of data written in the fourth storage volume as a journal.

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22. A method for controlling a storage device system according to claim 1, wherein the storage device system further includes a third storage device equipped with a seventh storage volume, wherein the second storage device and the third storage device are communicatively connected  
20 to each other, and the second storage device is equipped with a third write request section that requests the third storage device to write data according to the second communication protocol, the method comprising:

a step conducted by the information processing device of generating third data including a third command to be executed by the third storage

device;

a step conducted by the information processing device of sending to the first write request section a write request to write the third data according to the first communication protocol in the first storage volume;

5           when the third data written in the first storage volume is a command to the third storage device, a step conducted by the first storage device of sending to the second write request section a write request to write the third data according to the second communication protocol in the second storage volume;

10           when the third data written in the second storage volume is a command to the third storage device, a step conducted by the second storage device of sending to the third write request section a write request to write the third data according to the second communication protocol in the seventh storage volume; and

15           a step conducted by the third storage device of executing the third command sent in the third data written in the seventh volume.

23.   A method for controlling a storage device system according to claim 22, further comprising:

20           a step conducted by the first storage device of generating the third data including the third command to be executed by the third storage device, and sending to the second write request section a write request to write the third data according to the second communication protocol in the second storage volume.

24. A method for controlling a storage device system, the storage device system including

an information processing device,

5 a first storage device that is communicatively connected to the information processing device, and

a second storage device that is communicatively connected to the first storage device, the method comprising:

a step conducted by the information processing of generating first data including an address of the second storage device as a transfer destination and a first command to be executed at the second storage device;

a step conducted by the information processing device of sending the first data to the first storage device;

15 a step conducted by the first storage device of, upon receiving the first data, obtaining the address of the transfer destination from the first data;

a step conducted by the first storage device of generating second data including the first command that is set in the first data;

20 a step conducted by the first storage device of sending the second data to the second storage device;

a step conducted by the second storage device of, upon receiving the second data, obtaining the first command from the second data; and

a step conducted by the second storage device of executing the first

command.

25. A method for controlling a storage device system according to claim 24, wherein the step of generating the second data executed by the first storage device is a step of deleting the transfer destination address set in the first data.

26. A method for controlling a storage device system according to claim 24, wherein the step of generating the second data executed by the first storage device is a step of converting the first data into the second data, and the step of obtaining the first command from the second data is executed by the second storage device when the transfer destination address is an address of the second storage device.

27. A method for controlling a storage device system according to claim 25, wherein the storage device system is equipped with a third storage device that is communicatively connected to the second storage device, the method comprising:

a step conducted by the information processing device of generating an address of the second storage device as a first transfer destination, an address of the third storage device as a second transfer destination, and third data including a second command that is executed by the third storage device ;

a step conducted by the information processing device of sending



the third data to the first storage device;

a step conducted by the first storage device of, upon receiving the third data, obtaining the address of the first transfer destination from the third data;

5 a step conducted by the first storage device of generating fourth data by deleting the address of the first transfer destination from the third data;

a step conducted by the first storage device of sending the fourth data to the second storage device;

10 a step conducted by the second storage device of, upon receiving the fourth data, obtaining the address of the second transfer destination from the fourth data;

a step conducted by the second storage device of generating fifth data by deleting the address of the second transfer destination from the  
15 fourth data;

a step conducted by the second storage device of sending the fifth data to the third storage device;

a step conducted by the third storage device of, upon receiving the fifth data, obtaining the second command from the fifth data; and

20 a step conducted by the third storage device of executing the second command.

28. A method for controlling a storage device system according to claim 27, further comprising a step conducted by the first storage device of

generating third data including the second command that is executed by the third storage device.

29. A method for controlling a storage device system according to  
5 claim 27, further comprising:

a step conducted by the information processing device of generating the address of the second storage device as the first transfer destination, a third command that is executed by the second storage device, the address of the third storage device as the second transfer destination, and sixth  
10 data including a fourth command that is executed by the third storage device ;

a step conducted by the information processing device of sending the sixth data to the first storage device;

a step conducted by the first storage device of, upon receiving the  
15 sixth data, obtaining the address of the first transfer destination from the sixth data;

a step conducted by the first storage device of generating seventh data by deleting the address of the first transfer destination from the sixth data;

20 a step conducted by the first storage device of sending the seventh data to the second storage device;

a step conducted by the second storage device of, upon receiving the seventh data, obtaining the third command from the seventh data;

a step conducted by the second storage device of executing the third

command;

a step conducted by the second storage device of generating eighth data by deleting the third command and the address of the second transfer destination from the seventh data;

5 a step conducted by the second storage device of sending the eighth data to the third storage device;

a step conducted by the third storage device of, upon receiving the eight data, obtaining the fourth command from the eighth data; and

a step conducted by the third storage device of executing the fourth  
10 command.

30. A method for controlling a storage device system according to claim 27, wherein the first storage device is communicatively connected to the third storage device, the method comprising:

15 a step conducted by the first storage device of, upon receiving the third data, obtaining the second transfer destination;

a step conducted by the first storage device of generating the fifth data by deleting the first transfer destination and the second transfer destination from the third data; and

20 a step conducted by the third storage device of sending the fifth data to the third storage device.

31. A storage device system comprising:

an information processing device;

at least first and second storage devices, each of the first and second storage devices having a command analysis section that receives data including a command from one of the information processing device and another storage device and analyzes contents of the data, a data transfer  
5 section that sends the data to another storage device, and a command execution section that executes the command sent in the data,

wherein

the information processing device is communicatively connected to the first storage device,

10 the first storage device is communicatively connected to the second storage device,

the information processing device includes a data generation section that generates an address of the second storage device as a transfer destination and first data including a first command that is executed by  
15 the second storage device, and a data transfer section that sends the first data to the first storage device,

the command analysis section of the first storage device, upon receiving the first data from the information processing device, obtains the address of the transfer destination set in the first data, and instructs the  
20 data transfer section of the first storage device to transfer the first data to the address of the transfer destination,

the data transfer section of the first storage device generates second data by deleting the address of the transfer destination from the first data, and transfers the second data to the second storage device,

the command analysis section of the second storage device, upon receiving the second data from the first storage device, obtains the first command set in the second data, and instructs the command execution section of the second storage device to execute the first command, and

5       the command execution section of the second storage device executes the first command.